WHAT IS CLAIMED IS:

1. A method for determining lattice points to be referenced to prepare correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, said method comprising:

referencing the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space prescribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space, thereby acquiring correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space;

prescribing a smoothness evaluation function which evaluates the smoothness of arrangement of lattice points in the device-independent color space by using as a variable the lattice point position information in the low-dimensional color space, said function having a function form differing depending on each region in the color gamut to which the lattice point to be evaluated belongs and also containing a constraint condition that the closer the lattice point is to the boundary of the region of the color gamut, the more the evaluated value decreases as the result of its movement;

optimizing the arrangement of lattice points in the device-independent color-space by improving the rating of the

smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied; and

referencing the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data.

2.   The method for determining lattice points to be referenced to prepare the correspondence defining data as defined in Claim 1, wherein the smoothness evaluation function is a function which contains a term which is obtained by multiplying the formula expressing the magnitude of difference between the lattice point position information of the low-dimensional color space before variation and the lattice point position information of the low-dimensional color space after variation by a weighting factor which takes on a value which becomes larger as it departs from the middle point of the color component value of the low-dimensional color space.

3.   The method for determining lattice points to be referenced to prepare the correspondence defining data as defined in Claim 2, wherein the weighting factor increases relative to the color component value of the low-dimensional color space at a rate which becomes larger as the color component value of the low-dimensional color

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space departs from its middle point.

4. An apparatus for determining lattice points to be referenced to prepare correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, said apparatus comprising:

a unit to record the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space pre-scribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space;

a unit to acquire correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space by referencing the original correspondence defining data;

a unit to calculate a smoothness evaluation function which evaluates the smoothness of arrangement of lattice points in the device-independent color space by using as a vari-able the lattice point position information in the low-dimensional color space, said function having a function form differing depending on each region in the color gamut to which the lattice point to be evaluated belongs and also containing a constraint condition that the closer the lat-tice point is to the boundary of the region of the color gamut, the more the evaluated value decreases as the result of its movement;

a unit to optimize the arrangement of lattice points in the device-independent color-space by improving the rating of the smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied; and

a unit to reference the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data.

5. A program product which enables the computer to realize the capability of determining lattice points to be referenced to prepare correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, said program product comprising:

a feature to record in a prescribed recording medium the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space prescribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space and to acquire correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space by referencing the original correspondence defining data;

a feature to calculate a smoothness evaluation function which evaluates the smoothness of arrangement of lattice points in the device-independent color space by using as a variable the lattice point position information in the low-dimensional color space, said function having a function form differing depending on each region in the color gamut to which the lattice point to be evaluated belongs and also containing a constraint condition that the closer the lattice point is to the boundary of the region of the color gamut, the more the evaluated value decreases as the result of its movement;

a feature to optimize the arrangement of lattice points in the device-independent color-space by improving the rating of the smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied; and

a feature to reference the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data.

6. A print controlling apparatus for generating the printing data which permit printing by referencing correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system and converting

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the color component value in the color system into the

amount of ink, which is characterized in that:

the correspondence defining data is one which is prepared

by referencing the original correspondence defining data

which previously prescribes correspondence between the

lattice points in the low-dimensional color space pre-

scribed by less color components than the number of inks

and the lattice points for ink amount in the ink amount

space, thereby acquiring correspondence between the lattice

points in the low-dimensional color space and the lattice

points in the device-independent color space, prescribing a

smoothness evaluation function which evaluates the smooth-

ness of arrangement of lattice points in the device-

independent color space by using as a variable the lattice

point position information in the low-dimensional color

space, said function having a function form differing de-

pending on each region in the color gamut to which the

lattice point to be evaluated belongs and also containing a

constraint condition that the closer the lattice point is

to the boundary of the region of the color gamut, the more

the evaluated value decreases as the result of its movement,

optimizing the arrangement of lattice points in the device-

independent color-space by improving the rating of the

smoothness evaluation function, with the lattice point

position information in the low-dimensional color space

varied, referencing the original correspondence defining

data, thereby associating the amount of each ink corre-

sponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data to establish the lattice points for preparing the correspondence defining data, and associating the amount of ink with the color component value in the other color system by means of the colorimetric value measured by using a prescribed colorimetry for the result of printing with the amount of ink prescribed by the lattice points to be referenced to prepare the correspondence defining data.

7. A print controlling method for generating the printing data which permit printing by referencing correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system and converting the color component value in the color system into the amount of ink, which is characterized in that:
the correspondence defining data is one which is prepared by referencing the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space prescribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space, thereby acquiring correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space, prescribing a

smoothness evaluation function which evaluates the smooth-
ness of arrangement of lattice points in the device-
independent color space by using as a variable the lattice
point position information in the low-dimensional color
space, said function having a function form differing de-
pending on each region in the color gamut to which the
lattice point to be evaluated belongs and also containing a
constraint condition that the closer the lattice point is
to the boundary of the region of the color gamut, the more
the evaluated value decreases as the result of its movement,
optimizing the arrangement of lattice points in the device-
independent color-space by improving the rating of the
smoothness evaluation function, with the lattice point
position information in the low-dimensional color space
varied, referencing the original correspondence defining
data, thereby associating the amount of each ink corre-
sponding to the lattice points in the low-dimensional color
space in the optimized state with the lattice points in the
low-dimensional color space prescribed by the original
correspondence defining data to establish the lattice
points for preparing the correspondence defining data, and
associating the amount of ink with the color component
value in the other color system by means of the col-
orimetric value measured by using a prescribed colorimetry
for the result of printing with the amount of ink pre-
scribed by the lattice points to be referenced to prepare
the correspondence defining data.

8. A print controlling program product which enables
the computer to realize the capability of generating the
printing data which permit printing by referencing corre-
spondence defining data that defines correspondence between
the amount of each ink used by the printing apparatus and
the color component value in a color system and converting
the color component value in the color system into the
amount of ink, which is characterized in that:
the correspondence defining data is one which is prepared
by referencing the original correspondence defining data
which previously prescribes correspondence between the
lattice points in the low-dimensional color space pre-
scribed by less color components than the number of inks
and the lattice points for ink amount in the ink amount
space, thereby acquiring correspondence between the lattice
points in the low-dimensional color space and the lattice
points in the device-independent color space, prescribing a
smoothness evaluation function which evaluates the smooth-
ness of arrangement of lattice points in the device-
independent color space by using as a variable the lattice
point position information in the low-dimensional color
space, said function having a function form differing de-
pending on each region in the color gamut to which the
lattice point to be evaluated belongs and also containing a
constraint condition that the closer the lattice point is
to the boundary of the region of the color gamut, the more
the evaluated value decreases as the result of its movement,

optimizing the arrangement of lattice points in the device-independent color-space by improving the rating of the smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied, referencing the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data to establish the lattice points for preparing the correspondence defining data, and associating the amount of ink with the color component value in the color system by means of the colorimetric value measured by using a prescribed colorimetry for the result of printing with the amount of ink prescribed by the lattice points to be referenced to prepare the correspondence defining data.

9. A color converting apparatus which references correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, thereby converting the color component value in the color system into the amount of ink, which is characterized in that: the correspondence defining data is one which is prepared by referencing the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space pre-

scribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space, thereby acquiring correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space, prescribing a smoothness evaluation function which evaluates the smoothness of arrangement of lattice points in the device-independent color space by using as a variable the lattice point position information in the low-dimensional color space, said function having a function form differing depending on each region in the color gamut to which the lattice point to be evaluated belongs and also containing a constraint condition that the closer the lattice point is to the boundary of the region of the color gamut, the more the evaluated value decreases as the result of its movement, optimizing the arrangement of lattice points in the device-independent color-space by improving the rating of the smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied, referencing the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data to establish the lattice points for preparing the correspondence defining data, and associating the amount of ink with the color component

value in the other color system by means of the colorimetric value measured by using a prescribed colorimetry for the result of printing with the amount of ink prescribed by the lattice points to be referenced to prepare the correspondence defining data.

10. A color converting method which references correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, thereby converting the color component value in the color system into the amount of ink, which is characterized in that:
the correspondence defining data is one which is prepared by referencing the original correspondence defining data which previously prescribes correspondence between the lattice points in the low-dimensional color space prescribed by less color components than the number of inks and the lattice points for ink amount in the ink amount space, thereby acquiring correspondence between the lattice points in the low-dimensional color space and the lattice points in the device-independent color space, prescribing a smoothness evaluation function which evaluates the smoothness of arrangement of lattice points in the device-independent color space by using as a variable the lattice point position information in the low-dimensional color space, said function having a function form differing depending on each region in the color gamut to which the lattice point to be evaluated belongs and also containing a

constraint condition that the closer the lattice point is to the boundary of the region of the color gamut, the more the evaluated value decreases as the result of its movement, optimizing the arrangement of lattice points in the device-independent color-space by improving the rating of the smoothness evaluation function, with the lattice point position information in the low-dimensional color space varied, referencing the original correspondence defining data, thereby associating the amount of each ink corresponding to the lattice points in the low-dimensional color space in the optimized state with the lattice points in the low-dimensional color space prescribed by the original correspondence defining data to establish the lattice points for preparing the correspondence defining data, and associating the amount of ink with the color component value in the other color system by means of the colorimetric value measured by using a prescribed colorimetry for the result of printing with the amount of ink prescribed by the lattice points to be referenced to prepare the correspondence defining data.

11. A color converting program product which references correspondence defining data that defines correspondence between the amount of each ink used by the printing apparatus and the color component value in a color system, thereby converting the color component value in the color system into the amount of ink, which is characterized in that:

the correspondence defining data is one which is prepared
by referencing the original correspondence defining data
which previously prescribes correspondence between the
lattice points in the low-dimensional color space pre-
scribed by less color components than the number of inks
and the lattice points for ink amount in the ink amount
space, thereby acquiring correspondence between the lattice
points in the low-dimensional color space and the lattice
points in the device-independent color space, prescribing a
smoothness evaluation function which evaluates the smooth-
ness of arrangement of lattice points in the device-
independent color space by using as a variable the lattice
point position information in the low-dimensional color
space, said function having a function form differing de-
pending on each region in the color gamut to which the
lattice point to be evaluated belongs and also containing a
constraint condition that the closer the lattice point is
to the boundary of the region of the color gamut, the more
the evaluated value decreases as the result of its movement,
optimizing the arrangement of lattice points in the device-
independent color-space by improving the rating of the
smoothness evaluation function, with the lattice point
position information in the low-dimensional color space
varied, referencing the original correspondence defining
data, thereby associating the amount of each ink corre-
sponding to the lattice points in the low-dimensional color
space in the optimized state with the lattice points in the

low-dimensional color space prescribed by the original

correspondence defining data to establish the lattice

points for preparing the correspondence defining data, and

associating the amount of ink with the color component

value in the other color system by means of the col-

orimetric value measured by using a prescribed colorimetry

for the result of printing with the amount of ink pre-

scribed by the lattice points to be referenced to prepare

the correspondence defining data.